Design Concept for IR Frequency Stretching Crystals for LiDAR and IR Frequency Normalization Crystals for LiDAR-Stealth Capability

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Introduction

The ability to generate a multitude of frequencies of light with each frequency corresponding to a different part of the field of view is essential to the function of LiDAR, which, in turn, is essential to ABM systems. The capability of taking a single-mode laser and subtly varying its frequency is based upon the principle of frequency stretching using crystal structures.

This capability is based upon the layering of multiple lattices over a substrate with a substrate thicknesses that gradually increase from one layer to the next. Each interaction with a crystal, provided it is calibrated precisely, stretches the wavelength a little more using the magnetic properties of the crystal. Attempting too large of a change in any one pass would not yield results, but knowing exactly what the zone of influence of each layer will be with respect to a frequency of light enables one to gradually space the lattices with a larger gap. After passing through thousands of these structures, any light emitted would have a different frequency based upon the thickness of the material it was passed through. That's where laser ablation comes in: Etching part of the structure away to infinitely vary the gamut of frequencies emitted.

Now that we're covered how this multi-spectral light can be generated, we can formulate a defense against the three dimensional characterization of any ballistic object by a LiDAR system.

Abstract

I described a prismatic approach to frequency distortion of incoming light from a LiDAR system. I did not, however, describe how we might go about tailoring that prismatic coating to achieve the desired effect. The goal, of course, is to modulate incoming light using the skin of a ballistic object and normalize the frequency of all reflected/refracted light to render the data useless (or at least, less useful) to an ABM guidance system.

In a frequency normalization crystal, the magnetism of crystal lattice nodes is used to both stretch and compress wavelengths of light depending upon where they pass relative to a magnetic molecules in the crystal. The magnetic molecule would have an "eye of the needle" sweet spot through which light of the desired frequency would be passed. The crystal would need to be composed of multiple magnetic molecules at each node, each node having the north magnetic orientation facing "out" toward other nodes and the south orientation facing in, toward one another. This would make each node's magnetism mutually repellant, which means that this force, albeit marginal, would need to be compensated for in the synthesis process. Unlike most crystals, the nodes in this crystal would actually have spaced "double nodes" where there is a transparent gap between the magnetic components through

which light can pass.

Once this type of structure can be synthesized, controlling the frequency of reflected light would be a simple matter of spacing the center of those double nodes at a desired interval e.g. 1530nm.

Conclusion

This type of coating would effectively negate the effectiveness of any ABM system based upon these principles, particularly when combined with plasma enveloping for RADAR-stealth.